

STEFFEN ROBERTSON AND KIRSTEN  
Consulting Engineers

January 20, 1988  
SRK Project No. 13701

Division of Environmental Health  
Water Pollution Control  
288 North 1460 West  
P.O. Box 16690  
Salt Lake City, Utah 84116-0690

RECEIVED  
JAN 25 1988

DIVISION OF  
OIL, GAS & MINING

Attention: Mr. Charles Dietz

RE: TINTIC SPENT HEAP MATERIAL LEACHATE

Dear Mr. Dietz,

The results of the EP Toxicity test for the Tintic Project spent heap material are attached. The only parameter to exceed the soluble threshold limits concentration (STLC) was lead (Pb) at 196 mg/l. Lead minerals are readily dissolved by acetic acid and which often leads to high test results.

Since acetic acid is not representative of the environmental conditions anticipated at the site following reclamation, the spent material was leached with simulated rainwater (i.e., pH 6 solution). The material was leached with the solution at a rate to simulate six inches of precipitation over a 24-hour period. The lead concentration in the resulting leachate was <0.10 mg/l, which is significantly less than the STLC of 5 mg/l.

Based on these test results, it is our opinion that infiltration through the spent material will not result in a leachate potentially hazardous or threatening to the environment or groundwater quality. Therefore, no special provisions for containment or isolation of the spent material is included in the reclamation plans. Also, the use of the material for contouring around the plant, pond, and heap areas should not result in leachate problems following reclamation.

If you should have any questions or require additional information, please call me.

Sincerely,

STEFFEN ROBERTSON AND KIRSTEN  
(COLORADO) INC.

Don A. Poulter, P.E.  
Project Engineer

DAP/gg

Encl.

3232 South Vance Street, Suite 210, Lakewood, Colorado 80227, U.S.A.  
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Other offices in: U.S.A., Canada, United Kingdom and Africa

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OIL, GAS & MINING

SIERRA ENVIRONMENTAL MONITORING

# WATER QUALITY ANALYSIS RECORD

[illegible]

SAMPLES BY: Mc Clelland Laboratories  
ANALYSIS BY: SEM - J. Seher

APPROVED BY: 





11/023/007  
Norman H. Bangerter  
Governor

Suzanne Dandoy, M.D., M.P.H.  
Executive Director

December 14, 1987

RECEIVED  
DEC 16 1987

DIVISION OF  
OIL, GAS & MINING

Mr. Joseph C. Milbourne  
North Lily Mining Co.  
P.O. Box 759  
2305 Carlos Street, Suite A  
Moss Beach, California 94038

RE: Tintic Project  
Plan review comments

Dear Mr. Milbourne:

We have reviewed the plans and specifications received during your 18 November 1987 visit concerning the Tintic Heap Leach facilities. We have the following comments which should be addressed and incorporated into the plans and specifications:

A. The following are comments which relate to the specifications and references are provided for your convenience:

1. Reference 3.2;  
It must be specified that a secondary liner will be constructed of materials meeting acceptable thickness, permeability rate, density and gradation limit requirements. The Bureau of Water Pollution Control will approve a recommended material after the preliminary information concerning these parameters have been reviewed and evaluated. This position is consistent with the position expressed by myself in the predesign conference held 30 September 1987.
2. Reference 3.2;  
Additional information concerning the slotted piping which will be placed directly over the liner should be provided. This information should include the orientation of the perforations and the design conductivity of the proposed system. Also, an evaluation of the potential for damage to the synthetic liner by these collection pipes once the ore body has been placed upon them should be presented.
3. Reference 3.2;  
The spacing of these process solutions collection pipes should be clarified as they are shown spaced 40 feet center to center on drawing No. 13701/01 and are specified 15 to 25 feet center to center in the specifications.



4. Reference 3.2.1;  
The permeability rate of the silty-clay and clay-silt material which is proposed to be used to construct the secondary liner must be established by testing.
5. Reference 3.2.1;  
It is requested that sufficient detail be provided concerning the channel from the heap leach pad to the pregnant solution pond to determine if a pool of process solution will pond on the heap leach pad liner surface.
6. Reference 3.2.1;  
It must be understood that the policy of the Bureau of Water Pollution Control is that no leakage will be allowed to contaminate or degrade the ground water system.
7. Reference 3.3;  
Adequate capacity must be provided to contain a complete draindown of the Heap leach pads, the 10 year 24 hour storm event which may fall on the area which drains into the process ponds and the design snow melt for this same area.
8. Reference 3.6;  
In addition to the grubbing requirement indicated, all areas which will be covered by a synthetic liner must have all organic materials removed.
9. Reference 5.1/5.2;  
Specifications should be provided for materials of construction which will be used to construct the leakage detection/collection system.
10. Reference 6.0;  
The quality of construction of the secondary liner system must be verified by construction quality control requirements including density, thickness, soil characteristics and permeability which will be agreed upon and specified in the construction permit.
11. Reference 7.1;  
The facility to which the contents of a process pond will be drained in the event of leakage should be specified.
12. Reference 7.1;  
The method for locating any leak which may occur in the 10 Acre ± heap leach pad should be indicated.
13. Reference 7.3;  
Facilities and materials to contain and treat the maximum amount of potentially hazardous materials on site at any point in time should be indicated.



14. Reference 7.3;  
The mine manager must notify the Bureau of Water Pollution Control within 24 hours by telephone and within 7 days in writing in the event of leakage or a spill.
15. Reference 7.3;  
Contaminated materials resulting from spills must be neutralized and disposed of in an approved location.
16. Reference 8.0;  
Once leaching procedures are completed the spent ore should be neutralized to meet the following minimum criteria:
  - a. pH of 6.5 to 7.5
  - b. Weak acid dissociable (WAD) cyanides less than or equal to 0.20 mg/l.
  - c. Total cyanide less than or equal to 0.75 mg/l.
  - d. Metals content shall meet drinking water standards or surface water quality standards which ever is lower.
17. Reference 8.0;  
Methods which will be utilized to insure that the spent ore heaps are completely and uniformly neutralized shall be included in the specifications. In addition the extent to which the neutralized heap material will be spread out to cover all earthworks and liner materials, as stated in the specifications, should be defined.
18. Reference 8.0;  
If neutralized spent ore will be left exposed to the environment it must be demonstrated that metals and other elements contained in the spent ore will not be leached into the environment by precipitation or other naturally occurring phenomenon.
19. Reference 8.0;  
Once the process solutions from the pregnant and barren ponds are evaporated the remaining contents of the ponds shall be neutralized and any slimes, precipitants, solids etc. remaining shall be removed and properly disposed of. If the liner material is to be left in place once the preceding has been accomplished it must be folded such that no precipitation will become trapped within the liner.
20. Reference tech. spec. 5.3;  
Minimum requirements shall be established throughout these specifications for material characteristics, design characteristics, field testing verifications etc so the area beneath the heap leach synthetic liner will serve as a leakage detection/collection system and an impervious secondary liner.



21. Reference tech. spec. 6.2;  
The design characteristics of the synthetic liners and leakage detection/collection system are critical components of the liner system. Specific information including design criteria, thickness selection rational, foundation criteria and preparation, seam installation and quality control, transmissivity of the leakage collection system should be submitted for review.
22. Reference tech. spec. 6.2;  
A specific maximum time limit should be specified for covering the liner with sand ect., to protect it from UV deterioration.
23. Reference tech spec. 6.3;  
The specifications should emphasize that only the highest quality control field seaming procedures and field testing procedures will be acceptable.
24. Reference tech spec 6.4;  
The specifications should indicate that the liner for the pipeline ditches will only be placed on a prepared surface meeting specified construction requirements.
25. Reference tech spec. 7.2;  
As previously mentioned synthetic liners should be placed upon a leakage detection/collection system which in turn is placed on a secondary liner. This section should be revised to reflect this concept.
26. Reference tech spec. 8.1  
It would seem advisable that the procedures for construction of fills should be specified prior to entering into an agreement with a contractor to provide those services.
27. reference tech spec. 9.0  
Whatever resources are required to achieve an acceptable quality secondary liner must be specified.
28. Reference tech spec. 9.1  
Specifications for construction quality control must be specified for each lift of the secondary liner. Frequency and types of tests which will be required to verify density, thickness, material quality and permeability must be specified.

B. The following comments relate to the plans submitted for review,

1. Drawing 13701/02
  - a. Adequate information should be provided for the storm water runoff ditches to demonstrate they have adequate capacity to carry all updrainage flows.



- b. Section D-D should show a storm runoff diversion dike all around the perimeter of the barren and pregnant solution ponds.

2. Drawing 13701/03

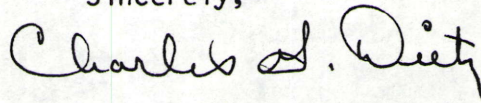
- a. The drawing should show the type of leakage detection/collection system which will be specified i.e. either synthetic drainage mat or 12 inches of sand.
- b. The details of the synthetic liner anchor trench throughout this drawing should uniformly show that a trench will be required and that the backfill must be compacted.
- c. A section of the gravity drain from the heap leach pad to the pregnant liquor pond should be provided for review.
- d. The details of this drawing should be revised to show the overall design concept that a leakage detection/collection system and a secondary liner will be required for the heap leach pad and the pregnant and barren solution ponds.
- e. The sections of the Barren and Pregnant solution ponds should show a berm around the perimeter to prevent surface runoff water from entering the pond.
- f. The detail of the ditch from the heap leach pad to the pregnant solution pond should have the leakage detection/collection media defined and the anchor detail for the secondary liner clarified.
- g. If the sand and pipe leakage detection/collection system is to be specified, additional information will need to be provided about this detail concerning; orientation and means proposed to prevent blockage of slotted pipes. A profile view of the sampling riser pipe must be provided for review along with the method proposed for collecting samples.
- h. Which ever leakage detection/collections system is proposed it should be designed to drain by gravity to a sump so no ponding of leakage on the secondary liner will occur.
- i. Leakage monitoring frequency and sampling techniques must be defined in this document in addition to the parameters which will be tested for.



This concludes our comments on this plan and specification submittal. These comments should be included in the plans and specifications or responded to. A revised set of plans and specifications should be submitted to Mr. Roger Foisey, Central Utah District Health Department, 201 East 500 North, Richfield Utah 84701, and a revised set should be submitted to this office for further review.

Please call me at 538-6146 if there are any questions.

Sincerely,

A handwritten signature in cursive script, reading "Charles G. Dietz".

Charles G. Dietz, P.E.  
Bureau of Water Pollution Control

CGD/lme

c.c. Mr. Don Poulter, Steffen, Robertson & Kirston  
Mr. Roger Foisey, Central Utah District Health Dept.  
Mr. Dave Wham, Oil, Gas & Mining

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